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A model for line-mixing in $\Pi - \Sigma$ CO_2 Q-branches was developed in support of the CLAES instrument that flew on the Upper Atmosphere Research Satellite. CLAES uses the 791 cm^{-1} Q-branch of CO_2 to determine stratospheric temperatures. We developed a tunable diode laser spectrometer capable of measuring very accurate absolute transmission spectra and recorded extensive spectra of the 791 and 2070 cm^{-1} CO_2 Q-branches.

These spectra were used to develop a model for rotational line-mixing with only a single adjustable parameter, which we call β. This parameter determines the relative probability of $e \leftarrow f$ versus $f \leftarrow f$ collisions in the Π state of CO_2. When $\beta = 0.5$, these two types of collisions are equally likely. For $\beta = 1.0$, only $f \leftarrow f$ collisions are allowed. We find that β is close to 0.5 for CO_2-CO_2collisions, while β is somewhat greater than 0.5 for CO_2-N_2 collisions.

We used the stronger 2070 cm^{-1} Q-branch to examine the temperature dependence of line-mixing between 210 K and 340 K for CO_2-CO_2 collisions. We find only a small dependence of β on temperature which can be attributed to differences in the thermal populations of J states in Q-branch. We sucessfully applied this line shape model to ATMOS spectra recorded on SpaceLab 3 (the 1932 and 618 cm^{-1} Q-branches) which verified the accuracy of our model at low temperatures for CO_2-N_2 collisions.

We delivered a set of variable temperature line-mixing coefficients to the CLAES science team at Lockheed that allowed them to easily include line-mixing in their retrieval algorithms.

Reference D. P. Edwards and L. L. Strow, *Spectral Line Shape Considerations for Limb Temperature Sounders*, J. Geophys. Res., Vol. 96, No. D11, Pgs. 20,859-20,868, Nov. 20, 1991 and references therein.

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